

Learning and Environmental Awareness Partnership

Unit 6

Grades 3 - 4

Module Review

Subject Areas: Environmental Studies; Health; History; Science; Social Studies

Learning Objectives: Students will review and be tested on concepts learned throughout the Air Module. Students will also have the opportunity to test their knowledge of the subject matter in activities designed to draw on concepts from various units.

Vocabulary: No new vocabulary will be used in this unit.



Grades 3-4 R-1

Air Module Review

Units 1 - 5

| A. Word Scramble: (2 p Unscramble the letter | oints each) s below to form vocabulary w | ords. |
|--|---|--|
| neeyrozola | | |
| ofeluib | | |
| dcai nira | | |
| dkkewmie | | |
| noracb xiedodi | | |
| | | |
| B. Multiple Choice: (1 p 1. Where is the "good" ozone | e layer located? | |
| A. Troposphere | B. Mesosphere | C. Stratosphere |
| 2. What does the good ozone A. The sun | layer protect the earth from? B. Ozone | C. Ultraviolet radiation |
| 3. Which of the following ap A. Stoves | pliances in your house could h B. Refrigerators | nave CFCs in them? C. Televisions |
| 4. Skin cancer, eye cataracts A. Ground-level ozone | and crop damage can all be ca B. Ultraviolet radiation | used by what? C. Temperature Inversions |
| 5. Partners for Clean Air and program? | the Indianapolis Knozone Pro | ogram are examples of what kind of |
| A. Voluntary reduction | B. Citizen action | C. Both A and B |
| • | e a mixture of smoke and fog, lution problem found in Indian | which term is now used to describe a |
| A. Ozone | B. Smog | C. Ozone Action Days |

R-2 Grades 3-4

| 7. Each day, you breath how a A. 10 lbs. | much air? B. 50 lbs. | C. 35 lbs. |
|--|--|---|
| 8. Acid rain is formed by the A. Nitrogen | mixing of water and what che B. Sulfur dioxide | mical? C. Carbon Monoxide |
| 9. Lightening and forest fires possible source? | are types of natural sources of | f air pollution. What is another |
| A. Volcanoes | B. Tornadoes | C. Plants |
| 10. The pH scale ranges from A. >7 | 0 to 14. An acid has what pH B. 7 | ? C. < 7 |
| 11. Which category of air po emissions from? | llution sources doesn't move a | around and is easier to count |
| A. Mobile sources | B. Point sources | C. Non-road sources |
| 12. This form of pollution can A. Dirt | n come from dust, soot or ever B. Smoke | n paved roads. C. Particulate |
| 13. You can help reduce air p A. Riding your bike | ollution on high ozone days b B. Painting | y doing which of the following? C. Fishing |
| 14. Over which country can y A. Australia | you find one of the holes in the B. Egypt | e protective ozone layer? C. Spain |
| 15. Glues in plywood and pre contribute to indoor air pollut | = | hat kind of chemical that can |
| A. Nitrogen dioxide | B. Formaldehyde | C. Asbestos |
| 16. This is the second largest A. Nitrogen | ingredient of air. B. Pollution | C. Oxygen |
| 17. What are the air pollution A. Primary standards | standards called that protect l B. Health standards | numan life? C. Life standards |
| 18. What was the name of the directions on how to begin cle | _ | gave state and local governments |
| A. Clean Air Act | B. National Pollution Act | C. Federal Air Act |

Grades 3-4 R-3

| 19. What kind of air p A. Lead | ollution can prevent your body from g B. Asbestos | getting the oxygen it needs to survive? C. Carbon monoxide | |
|--|--|---|--|
| 20. What was the inter A. Montreal Protocol | rnational treaty designed to eliminate B. Detroit Protocol | the production of most CFCs called? C. New York Protocol | |
| C. True or False: | (1 point each) | | |
| 1. North America has True or | an ozone hole located over it. False | | |
| 2. Countries that don't | t use CFCs will not be affected by ozo False | one holes. | |
| 3. An ozone hole is ac True or | tually a thin area of the protective ozo | one layer. | |
| ozone layer. | ad" ozone molecules are the same as ' | 'good" ozone found in the protective | |
| True or | False | | |
| 5. Certain lung disease True or | es and conditions can be made worse False | by ground-level ozone. | |
| 6. Indiana does not ha True or | ve temperature inversions. False | | |
| 7. The atmosphere ext | tends about 120 kilometers or 75 mile False | s above the earth's surface. | |
| 8. Smog in Indiana is True or | released directly into the air by factor. False | ies and point sources. | |
| 9. When breathed in, sulfur dioxide can bother your lungs and hurt people with lung disease or respiratory problems. | | | |
| True or | False | | |
| 10. Lemon juice is bas True or | sic. False | | |

| 11. The Unite standard in 19 | | s Environmental Protection Agency (US EPA) adopted a new national ozone |
|------------------------------|----------------|---|
| True | or | False |
| 12. You can a | ılways s | ee air pollution. |
| True | or | False |
| 13. Most of Ir True | ndiana's or | s air pollution comes from large, point sources like factories. False |
| 14. Ground-le True | evel ozo or | ne is a problem for only four areas of Indiana. False |
| 1 0 1 | hy or la | nd features can affect how air pollution moves around Indiana. False |
| 16. Alternativ | re fuels or | are available for cars, trucks and buses that produce little or no air pollution. False |
| 17. Coal, oil, True | _ | e and natural gas are all fossil fuels. False |
| 18. Cars and teach year. | trucks re | elease about 50% of the volatile organic compounds (VOCs) in Indiana's air |
| True | or | False |
| 19. It is better | to not | use the drive-thru on days when ozone levels are high. |
| True | or | False |
| 20. Coal is a f | fossil fu | el that is called a renewable energy source. |
| True | or | False |

Grades 3-4 R-5

| D. Word Match: (2 point each) | |
|--|---|
| Ground-level Ozone | Criteria Pollutants |
| Nitrogen | Greenbelt |
| Oil | Dobson Unit |
| Methane | Air pollution monitors |
| Non-road sources | Compressed Natural Gas (CNG) |
| Ozone Action Days | Acid rain |
| Coal | Atmosphere |
| Non-renewable energy | Oxygen |
| Thermosphere | Troposphere |
| Lead | Carbon Monoxide |
| Buffers | Solar |
| Gasoline | |
| 1 is the most importan | nt natural and manmade greenhouse gas. |
| 2 and a when used to make energy. | re two examples of fossil fuels which can release pollutants |
| when used to make energy. | |
| 3. Cities and towns can useshrubs and vegetation use up extra ca | to help reduce the air pollution because the trees, arbon dioxide and catch pollutants. |
| 4. Some alternative vehicles use when burned, other than water vapor | because it releases no pollutants to air |
| 5 can not be | regenerated or reused. |
| 6. The is the | layer of air which surrounds the earth. |
| 7 can cause health destroy living cells. | problems for people, plants and animals because it can |
| 8. During the summer months, local people to the need to help reduce air | or state officials may call an to alert pollution. |
| 9. Indiana is one of the top three | producers in the United States. |
| 10. CFCs created in the | can work their way up to the "good" ozone layer. |
| 11 and atmosphere. | _ are the two most common gases in the earth's |

R-6 Grades 3-4

| 12 is a kind of air pollution source which can be hard to count and include small engines like weed eaters. |
|---|
| 13. A is used as the measurement of the ozone layer's thickness. |
| 14. The pH of can affect the plant life, aquatic life and buildings and monuments. |
| 15. IDEM is required to monitor for six primary pollutants called |
| 16 and are two of the dirty six pollutants. |
| 17. The earth's atmosphere has four layers. The layer where temperatures can get as high as 1000°F is called the |
| 18. Miners used canaries as natural in the 1800's. |
| 19. Because of the limestone in Indiana's soil, the soil the pH of acid rain and helps reduce the effect on plants. |
| 20 energy can be used to fuel cars and homes. |
| E. Essay: (10 points) |
| Write a list of four things you or some one you know can do to help reduce "bad" or ground-level ozone. |
| 1 |
| |
| 2 |
| |
| 3 |
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| |

Grades 3-4 R-7

Air Module Review

Units 1 - 5 ANSWER KEY

A. Word Scramble: (2 points each)

Unscramble the letters below to form vocabulary words.

neeyrozola OZONE LAYER

ofeluib BIOFUEL

dcai nira ACID RAIN

dkkewmie MILKWEED

B. Multiple Choice: (1 point each)

- 1. Where is the "good" ozone layer located?
- C. Stratosphere
- 2. What does the good ozone layer protect the earth from?
- C. Ultraviolet radiation
- 3. Which of the following appliances could have CFCs in them?
- B. Refrigerators
- 4. Skin cancer, eye cataracts and crop damage can all be caused by what?
- B. Ultraviolet radiation
- 5. Partners for Clean Air and the Indianapolis Knozone Program are examples of what kind of program?
- C. Both A and B
- 6. Originally used to describe a combination of smoke and fog, which term is now used to describe a common summertime air pollution problem found in Indiana?
- B. Smog

Grades 3-4 A-1

7. Each day, you breath how much air?

C. 35 lbs.

8. Acid rain is formed by the mixing of water and what chemical?

B. Sulfur dioxide

9. Lightening and forest fires are examples of natural sources of air pollution. What is another possible source?

A. Volcanoes

10. The pH scale ranges from 0 to 14. An acid has what pH?

C. < 7

11. Which category of air pollution sources doesn't move around and is easier to count emissions from?

B. Point sources

12. This form of pollution can come from dust, soot or even paved roads.

C. Particulate

13. You can help reduce air pollution on high ozone days by doing which of the following? *A. Riding your bike*

14. Over which country can you find one of the holes in the protective ozone layer?

A. Australia

15. Glues in plywood and pressed wood products contain what kind of chemical that can contribute to indoor air pollution?

B. Formaldehyde

16. This is the second largest component of air.

C. Oxygen

17. What are the air pollution standards called that protect human life?

A. Primary standards

18. What was the name of the 1963 federal regulations that gave state and local governments directions on how to begin cleaning up the air?

A. Clean Air Act

19. What kind of air pollution can prevent your body from getting the oxygen it needs to survive?

C. Carbon monoxide

A-2 Grades 3-4

20. What was the international treaty designed to eliminate the production of most CFCs called?

A. Montreal Protocol

C. True or False: (1 point each)

1. North America has an ozone hole located over it.

True

2. Countries that don't use CFCs will not be affected by ozone holes.

False

3. An ozone hole is actually a thin area of the protective ozone layer.

True

4. Ground-level ozone molecules are the same as ozone found in the protective ozone layer.

True

5. Certain lung diseases and conditions can be made worse by ground-level ozone.

True

6. Indiana does not have temperature inversions.

False

7. The atmosphere extends about 120 kilometers or 75 miles above the earth's surface.

True

8. Smog in Indiana is emitted directly into the air by factories and point sources.

False

9. When breathed in, sulfur dioxide can irritate your lungs and hurt people with lung disease or respiratory problems.

True

10. Lemon juice is basic.

False

11. The United States Environmental Protection Agency (US EPA) adopted a new national ozone standard in 1997.

True

12. You can always see air pollution.

False

Grades 3-4 A-3

13. Most of Indiana's air pollution comes from large, point sources like factories. False

14. Ground-level ozone is a problem for only four areas of Indiana.

False

15. Topography can affect how air pollution moves around Indiana.

True

16. Alternative fuels are available for cars, trucks and buses that produce little or no air pollution.

True

17. Coal, oil, gasoline and natural gas are all considered fossil fuels.

True

18. Cars and trucks account for about 50% of the volatile organic compounds (VOCs) released into Indiana's air each year.

True

19. It is better to not use the drive-thru on days when ozone levels are high.

True

20. Coal is a fossil fuel that is considered to be a renewable energy source.

False

A-4 Grades 3-4

D. Word Match: (2 points each)

Ground-level Ozone Criteria Pollutants

Nitrogen Greenbelt
Oil Dobson Unit

Methane Air pollution monitors

Non-road sources Compressed Natural Gas (CNG)

Ozone Action Days

Coal

Non-renewable energy

Thermosphere

Lead

Acid rain

Atmosphere

Oxygen

Troposphere

Carbon Monoxide

Buffers Solar

Gasoline

- 1. *Methane* is one of the most important natural and manmade greenhouse gas.
- 2. *Gasoline* and *oil* are two examples of fossil fuels which can release pollutants when used to make energy.
- 3. Cities and towns can use *greenbelts* to help reduce the air pollution because the trees, shrubs and vegetation use up excess carbon dioxide and catch pollutants.
- 4. Some alternative vehicles use *compressed natural gas (CNG)* because it releases no pollutants to air when burned, other than water vapor.
- 5. Non-renewable energy can not be regenerated or reused.
- 6. The *atmosphere* is the layer of air which surrounds the earth.
- 7. *Ground-level ozone* can cause health problems for people, plants and animals because it can destroy living cells.
- 8. During the summer months, local or state officials may call an *Ozone Action Day* to alert people to the need to help reduce air pollution.
- 9. Indiana is one of the top three *coal* producers in the United States.
- 10. CFCs created in the *troposphere* can work their way up to the "good" ozone layer.
- 11. Nitrogen and oxygen are the two most common gases in the earth's atmosphere.
- 12. *Non-road sources* is a category of air pollution sources which can be hard to count and include small engines like weed eaters.
- 13. A *Dobson Unit* is used as the basic measurement of the ozone layer's thickness.

Grades 3-4 A-5

- 14. The pH of acid rain can affect the plant life, aquatic life and buildings and monuments.
- 15. IDEM is required to monitor for six primary pollutants called *criteria pollutants*.
- 16. Carbon monoxide and lead are two of the dirty six pollutants.
- 17. The earth's atmosphere has four layers. The layer where temperatures can get as high as 1000°F is called the *thermosphere*.
- 18. Miners used canaries as natural air pollution monitors in the 1800's.
- 19. Because of the limestone in Indiana's soil, the soil *buffers* the pH of acid rain and helps reduce the effect on plants.
- 20. *Solar* energy can be used to fuel cars and homes.

E. Essay: (10 points)

Write a list of four things you or some one you know can do to help reduce "bad" or ground-level ozone.

| 1 | | |
|---|------|------|
| | | |
| 2 | | |
| | | |
| 3 | | |
| | | |
| 4 | | |

A-6 Grades 3-4



Learning and Environmental Awareness Partnership

Unit 6

Grades 5 - 6

Module Review

Subject Areas: Environmental Studies; Health; History; Science; Social Studies

Learning Objectives: Students will review and be tested on concepts learned throughout the Air Module. Students will also have the opportunity to test their knowledge of the subject matter in activities designed to draw on concepts from various units.

Vocabulary: No new vocabulary will be used in this unit.



Grades 5-6 R-1

Air Module Review

Units 1 - 5

| A. Multiple Choice: (1 p | | |
|---|--|---|
| 1. Where is the "good" ozone | = | |
| A. Troposphere | B. Mesosphere | C. Stratosphere |
| 2. What does the good ozone | layer protect the earth from? | |
| A. The sun | B. Ozone | C. Ultraviolet radiation |
| 3. Which of the following app | pliances could have CFCs in the | hem? |
| A. Stoves | B. Refrigerators | C. Televisions |
| 4. Skin cancer, eye cataracts a | and crop damage can all be car | used by what? |
| A. Ground-level ozone | B. Ultraviolet radiation | C. Temperature Inversions |
| 5. Partners for Clean Air and program? | the Indianapolis Knozone Pro | gram are examples of what kind of |
| A. Voluntary reduction | B. Citizen action | C. Both A and B |
| | a combination of smoke and a me air pollution problem four B. Smog | fog, which term is now used to ad in Indiana? C. Ozone Action Days |
| | <u> </u> | • |
| 7. Each day, you breath how | | |
| A. 10 lbs. | B. 50 lbs. | C. 35 lbs. |
| 8. Acid rain is formed by the | mixing of water and what che | mical? |
| A. Nitrogen | B. Sulfur dioxide | C. Carbon Monoxide |
| 9. Lightening and forest fires possible source? | are examples of natural source | es of air pollution. What is another |
| A. Volcanoes | B. Tornadoes | C. Plants |
| | 0 to 14. An acid has what pH | |
| A. >7 | B. 7 | C. < 7 |
| 11. Which category of air po emissions from? | llution sources doesn't move a | around and is easier to count |
| A. Mobile sources | B. Point sources | C. Non-road sources |

R-2 Grades 5-6

| 12. This form of pollution car A. Dirt | n come from dust, soot or ever B. Smoke | n paved roads. C. Particulate |
|--|--|---|
| 13. You can help reduce air p A. Riding your bike | ollution on high ozone days by B. Painting | y doing which of the following? C. Fishing |
| 14. Over which country can y A. Australia | ou find one of the holes in the B. Egypt | e protective ozone layer? C. Spain |
| contribute to indoor air pollut | | |
| A. Nitrogen dioxide | B. Formaldehyde | C. Asbestos |
| 16. This is the second largest A. Nitrogen | component of air. B. Pollution | C. Oxygen |
| 17. What are the air pollution A. Primary standards | standards called that protect l B. Health standards | numan life? C. Life standards |
| 18. What was the name of the directions on how to begin cle A. Clean Air Act | • | gave state and local governments C. Federal Air Act |
| 19. What kind of air pollution A. Lead | n can prevent your body from g B. Asbestos | getting the oxygen it needs to survive? C. Carbon monoxide |
| 20. What was the internationa A. Montreal Protocol | al treaty designed to eliminate B. Detroit Protocol | the production of most CFCs called? C. New York Protocol |
| B. True or False: (1 poin | t each) | |
| North America has an ozor True or False | ne hole located over it. | |
| 2. Countries that don't use Cl True or False | FCs will not be affected by ozo | one holes. |
| 3. An ozone hole is actually a True or False | thin area of the protective ozo | one layer. |

Grades 5-6 R-3

| | el ozone molecules are the same as ozone found in the protective ozone layer. or False |
|--------------------------------|--|
| 5. Certain lung True | diseases and conditions can be made worse by ground-level ozone. or False |
| | or False |
| _ * | nere extends about 120 kilometers or 75 miles above the earth's surface. or False |
| _ | iana is emitted directly into the air by factories and point sources. or False |
| 9. When breath respiratory pro | |
| 10. Lemon juic True | e is basic. or False |
| standard in 199 | States Environmental Protection Agency (US EPA) adopted a new national ozone 97. or False |
| | ways see air pollution. or False |
| | diana's air pollution comes from large, point sources like factories. or False |
| | vel ozone is a problem for only four areas of Indiana. or False |
| | y can affect how air pollution moves around Indiana. or False |
| | fuels are available for cars, trucks and buses that produce little or no air pollution. or False |
| | |

| 17. Coal, oil, True | _ | e and natural False | gas are all considered fossil fuels. |
|-----------------------------------|-----------------|-------------------------|--|
| 18. Cars and tinto Indiana's True | | | bout 50% of the volatile organic compounds (VOCs) released |
| 19. It is better True | to not u | use the drive False | -thru on days when ozone levels are high. |
| 20. Coal is a t True | fossil fu or | el that is con False | sidered to be a renewable energy source. |
| C. Word M | Iatch: | (2 points eac | ch) |
| Ground-level | Ozone | | Criteria Pollutants |
| Nitrogen | | | Greenbelt |
| Oil | | | Dobson Unit |
| Methane | | | Air pollution monitors |
| Non-road sou | rces | | Compressed Natural Gas (CNG) |
| Ozone Action | Days | | Acid rain |
| Coal | | | Atmosphere |
| Non-renewab | le energ | У | Oxygen |
| Thermospher | e | | Troposphere |
| Lead | | | Carbon Monoxide |
| Buffers | | | Solar |
| Gasoline | | | |
| 1 | is the | e most impor | rtant natural and manmade greenhouse gas. |
| 2. | and | | _ are two examples of fossil fuels which can release pollutants |
| when used to | | | _ 1 |
| | | | to help reduce the air pollution because the trees, ess carbon dioxide and catch pollutants. |
| 4. Some alter when burned, | | | because it releases no pollutants to air por. |
| 5 | | can not l | he regenerated or reused |

Grades 5-6 R-5

| 6. The | _ is the layer of air which surrounds the earth. | |
|--|--|--------------------|
| 7 can cause destroy living cells. | e health problems for people, plants and animal | ls because it can |
| 8. During the summer months people to the need to help red | s, local or state officials may call anuce air pollution. | to alert |
| 9. Indiana is one of the top the | ree producers in the United State | s. |
| 10. CFCs created in the | can work their way up to the "g | ood" ozone layer. |
| 11 and and | are the two most common gases in th | e earth's |
| 12 is a cate include small engines like we | egory of air pollution sources which can be harded eaters. | d to count and |
| 13. A is use | ed as the basic measurement of the ozone layer' | 's thickness. |
| 14. The pH ofmonuments. | can affect the plant life, aquatic life and bui | ldings and |
| 15. IDEM is required to moni | tors for six primary pollutants called | · |
| 16 and | are two of the dirty six pollutants. | |
| 17. The earth's atmosphere has 1000°F is called the | as four layers. The layer where temperatures car | n get as high as |
| 18. Miners used canaries as na | atural in the 1800's. | |
| 19. Because of the limestone helps reduce the effect on plan | in Indiana's soil, the soil the pl nts. | H of acid rain and |
| 20 energy car | n be used to fuel cars and homes. | |

R-6 Grades 5-6

D. Essay: (5 points each)

| 1. Discuss the five source categories on the Wheel of Sources (mobile, residential, non-road, area, industrial). Discuss the differences between each and give examples of each. |
|--|
| 2. Where does acid rain come from and what are some possible solutions? |
| 3. If all of the countries in the world stopped producing chlorofluorocarbons (CFCs) today, why wouldn't the holes in the protective ozone layer disappear immediately? |
| 4. Why does ground-level ozone form mainly during summer months in Indiana? |

Grades 5-6 R-7

Air Module Review

Units 1 - 5 ANSWER KEY

A. Multiple Choice: (1 point each)

- 1. Where is the "good" ozone layer located?
- C. Stratosphere
- 2. What does the good ozone layer protect the earth from?
- C. Ultraviolet radiation
- 3. Which of the following appliances could have CFCs in them?
- B. Refrigerators
- 4. Skin cancer, eye cataracts and crop damage can all be caused by what?
- B. Ultraviolet radiation
- 5. Partners for Clean Air and the Indianapolis Knozone Program are examples of what kind of program?
- C. Both A and B
- 6. Originally used to describe a combination of smoke and fog, which term is now used to describe a common summertime air pollution problem found in Indiana?
- B. Smog
- 7. Each day, you breath how much air?
- C. 35 lbs.
- 8. Acid rain is formed by the mixing of water and what chemical?
- B. Sulfur dioxide
- 9. Lightening and forest fires are examples of natural sources of air pollution. What is another possible source?
- A. Volcanoes
- 10. The pH scale ranges from 0 to 14. An acid has what pH?

C. < 7

Grades 5-6 A-1

- 11. Which category of air pollution sources doesn't move around and is easier to count emissions from?
- B. Point sources
- 12. This form of pollution can come from dust, soot or even paved roads.
- C. Particulate
- 13. You can help reduce air pollution on high ozone days by doing which of the following? *A. Riding your bike*
- 14. Over which country can you find one of the holes in the protective ozone layer?
- A. Australia
- 15. Glues in plywood and pressed wood products contain what kind of chemical that can contribute to indoor air pollution?
- B. Formaldehyde
- 16. This is the second largest component of air.
- C. Oxygen
- 17. What are the air pollution standards called that protect human life?
- A. Primary standards
- 18. What was the name of the 1963 federal regulations that gave state and local governments directions on how to begin cleaning up the air?
- A. Clean Air Act
- 19. What kind of air pollution can prevent your body from getting the oxygen it needs to survive? *C. Carbon monoxide*
- 20. What was the international treaty designed to eliminate the production of most CFCs called? *A. Montreal Protocol*

B. True or False: (1 point each)

1. North America has an ozone hole located over it.

True

2. Countries that don't use CFCs will not be affected by ozone holes.

False

A-2 Grades 5-6

3. An ozone hole is actually a thin area of the protective ozone layer. True

4. Ground-level ozone molecules are the same as ozone found in the protective ozone layer.

True

5. Certain lung diseases and conditions can be made worse by ground-level ozone.

True

6. Indiana does not have temperature inversions.

False

7. The atmosphere extends about 120 kilometers or 75 miles above the earth's surface.

True

8. Smog in Indiana is emitted directly into the air by factories and point sources.

False

9. When breathed in, sulfur dioxide can irritate your lungs and hurt people with lung disease or respiratory problems.

True

10. Lemon juice is basic.

False

11. The United States Environmental Protection Agency (US EPA) adopted a new national ozone standard in 1997.

True

12. You can always see air pollution.

False

13. Most of Indiana's air pollution comes from large, point sources like factories.

False

14. Ground-level ozone is a problem for only four areas of Indiana.

False

15. Topography can affect how air pollution moves around Indiana.

True

Grades 5-6 A-3

16. Alternative fuels are available for cars, trucks and buses that produce little or no air pollution.

True

17. Coal, oil, gasoline and natural gas are all considered fossil fuels.

True

18. Cars and trucks account for about 50% of the volatile organic compounds (VOCs) released into Indiana's air each year.

True

19. It is better to not use the drive-thru on days when ozone levels are high.

True

20. Coal is a fossil fuel that is considered to be a renewable energy source.

False

C. Word Match: (2 point each)

Ground-level Ozone Criteria Pollutants

Nitrogen Greenbelt
Oil Dobson Unit

Methane Air pollution monitors

Non-road sources Compressed Natural Gas (CNG)

Ozone Action Days

Coal

Non-renewable energy

Thermosphere

Lead

Acid rain

Atmosphere

Oxygen

Troposphere

Carbon Monoxide

Buffers Solar

Gasoline

- 1. *Methane* is one of the most important natural and manmade greenhouse gas.
- 2. *Gasoline* and *oil* are two examples of fossil fuels which can release pollutants when used to make energy.
- 3. Cities and towns can use *greenbelts* to help reduce the air pollution because the trees, shrubs and vegetation use up excess carbon dioxide and catch pollutants.

A-4 Grades 5-6

- 4. Some alternative vehicles use *compressed natural gas (CNG)* because it releases no pollutants to air when burned, other than water vapor.
- 5. *Non-renewable energy* can not be regenerated or reused.
- 6. The *atmosphere* is the layer of air which surrounds the earth.
- 7. *Ground-level ozone* can cause health problems for people, plants and animals because it can destroy living cells.
- 8. During the summer months, local or state officials may call an *Ozone Action Day* to alert people to the need to help reduce air pollution.
- 9. Indiana is one of the top three *coal* producers in the United States.
- 10. CFCs created in the *troposphere* can work their way up to the "good" ozone layer.
- 11. Nitrogen and oxygen are the two most common gases in the earth's atmosphere.
- 12. *Non-road sources* is a category of air pollution sources which can be hard to count and include small engines like weed eaters.
- 13. A *Dobson Unit* is used as the basic measurement of the ozone layer's thickness.
- 14. The pH of acid rain can affect the plant life, aquatic life and buildings and monuments.
- 15. IDEM is required to monitors for six primary pollutants called *criteria pollutants*.
- 16. Carbon monoxide and lead are two of the dirty six pollutants.
- 17. The earth's atmosphere has four layers. The layer where temperatures can get as high as 1000°F is called the *thermosphere*.
- 18. Miners used canaries as natural air pollution monitors in the 1800's.
- 19. Because of the limestone in Indiana's soil, the soil *buffers* the pH of acid rain and helps reduce the effect on plants.
- 20. *Solar* energy can be used to fuel cars and homes.

Grades 5-6 A-5

D. Essay: (5 points each)

The following information is offered as a general guide to possible solutions.

1. Discuss the five source categories on the Wheel of Sources (mobile, residential, non-road, area, industrial). Discuss the differences between each and give examples of each.

Mobile Sources are air pollution sources on the move (e.g. cars, trucks, buses, semi-trucks, construction equipment)

Residential Sources are found around your house or apartment and result from daily activities (e.g. paint, spray paint, nail polish remover, aerosol cans)

Non-road Sources have small gas powered engines and are typically hard to count sources of pollution (e.g. weedeaters, lawn mowers, boats).

Area Sources produce small amounts of pollution individually, but combined can contribute a large portion to Indiana's air pollution problems (e.g. dry cleaners, gas stations).

Industrial Sources typically release large amounts of chemicals, particulates and gases (e.g. large factories, utility plants, industries).

2. Where does acid rain come from and what are some possible solutions?

Acid rain is produced from air pollution. The smoke from burning oil, gasoline, coal and wood (fossil fuels) rise into the air. They mix with the water in the air to form acid rain. The main chemicals in the air pollution that create acid rain are sulfur dioxide (SO_2) and nitrogen oxides (NO_x).

Possible solutions to acid rain include new regulations or laws to reduce sulfur dioxide and nitrogen dioxide emissions. Washing coal and scrubbers are options for electric utilities. Turning off lights and reducing the amount of wasted electricity also helps.

3. If all of the countries in the world stopped producing chlorofluorocarbons (CFCs) today, why wouldn't the holes in the protective ozone layer disappear immediately?

CFC's in the atmosphere can stay unchanged for up to twenty (20) years. This means that even if CFC production stopped completely in the year 2000, it would be 2020 before all the CFC's in the atmosphere were destroyed.

A-6 Grades 5-6

4. Why does ground-level ozone form mainly during summer months in Indiana?

Indiana's ozone season begins May 1 and ends September 30 each year. Indiana receives more sunlight and has its highest temperatures combined with low wind speeds during summer. These weather conditions are necessary to create ozone. Ozone is created when nitrogen oxides, volatile organic compounds (VOCs) and sunlight combine.

Grades 5-6 A-7



Learning and Environmental Awareness Partnership

Unit 6

Grades 7 - 8

Module Review

Subject Areas: Environmental Studies; Health; History; Science; Social Studies

Learning Objectives: Students will review and be tested on concepts learned throughout the Air Module. Students will also have the opportunity to test their knowledge of the subject matter in activities designed to draw on concepts from various units.

Vocabulary: No new vocabulary will be used in this unit.



Grades 7-8 R-1

Air Module Review

Units 1 - 5

| A. Multiple Choice: (1 p | oint each) | |
|---|--|--|
| 1. Where is the "good" ozone | e layer located? | |
| A. Troposphere | B. Mesosphere | C. Stratosphere |
| 2. What does the good ozone | layer protect the earth from? | |
| A. The sun | B. Ozone | C. Ultraviolet radiation |
| 3. Which of the following ap | pliances could have CFCs in the | hem? |
| A. Stoves | B. Refrigerators | C. Televisions |
| 4. Skin cancer, eye cataracts | and crop damage can all be ca | used by what? |
| A. Ground-level ozone | B. Ultraviolet radiation | C. Temperature Inversions |
| 5. Partners for Clean Air and program? | the Indianapolis Knozone Pro | gram are examples of what kind of |
| A. Voluntary reduction | B. Citizen action | C. Both A and B |
| | e a combination of smoke and time air pollution problem four B. Smog | fog, which term is now used to and in Indiana? C. Ozone Action Days |
| 7. Each day, you breath how | much air? | |
| A. 10 lbs. | B. 50 lbs. | C. 35 lbs. |
| 8. Acid rain is formed by the | mixing of water and what che | emical? |
| A. Nitrogen | B. Sulfur dioxide | C. Carbon Monoxide |
| 9. Lightening and forest fires possible source? | are examples of natural sourc | es of air pollution. What is another |
| A. Volcanoes | B. Tornadoes | C. Plants |
| 10. The pH scale ranges from | o 0 to 14. An acid has what pH | ? |
| A. >7 | B. 7 | C. < 7 |
| 11. Which category of air poemissions from? | ollution sources doesn't move | around and is easier to count |
| A. Mobile sources | B. Point sources | C. Non-road sources |

R-2 Grades 7-8

| 12. This form of pollution ca A. Dirt | n come from dust, soot or even B. Smoke | n paved roads. C. Particulate |
|--|--|---|
| 13. You can help reduce air pA. Riding your bike | oollution on high ozone days b B. Painting | y doing which of the following? C. Fishing |
| 14. Over which country can y A. Australia | you find one of the holes in the B. Egypt | e protective ozone layer? C. Spain |
| contribute to indoor air pollu | | |
| A. Nitrogen dioxide | B. Formaldehyde | C. Asbestos |
| 16. This is the second largest A. Nitrogen | component of air. B. Pollution | C. Oxygen |
| 17. What are the air pollution A. Primary standards | standards called that protect l B. Health standards | numan life? C. Life standards |
| 18. What was the name of the directions on how to begin cl | | gave state and local governments |
| A. Clean Air Act | B. National Pollution Act | C. Federal Air Act |
| 19. What kind of air pollution A. Lead | n can prevent your body from B. Asbestos | getting the oxygen it needs to survive? C. Carbon monoxide |
| 20. What was the internation A. Montreal Protocol | al treaty designed to eliminate B. Detroit Protocol | the production of most CFCs called? C. New York Protocol |
| B. True or False: (1 poin | at each) | |
| 1. North America has an ozo True or False | ne hole located over it. | |
| 2. Countries that don't use Countries or False | FCs will not be affected by oz | one holes. |
| | a thin area of the protective oze | one layer. |
| 4. Ground-level ozone molec True or False | ules are the same as ozone for | and in the protective ozone layer. |

Grades 7-8 R-3

| Certain lung diseases and conditions can be made worse by ground-level ozone. True or False |
|---|
| 6. Indiana does not have temperature inversions. True or False |
| 7. The atmosphere extends about 120 kilometers or 75 miles above the earth's surface. True or False |
| 8. Smog in Indiana is emitted directly into the air by factories and point sources. True or False |
| 9. When breathed in, sulfur dioxide can irritate your lungs and hurt people with lung disease or respiratory problems. True or False |
| 10. Lemon juice is basic. True or False |
| 11. The United States Environmental Protection Agency (US EPA) adopted a new national ozon standard in 1997. True or False |
| 12. You can always see air pollution. True or False |
| Most of Indiana's air pollution comes from large, point sources like factories. True or False |
| 14. Ground-level ozone is a problem for only four areas of Indiana. True or False |
| 15. Topography can affect how air pollution moves around Indiana. True or False |
| 16. Alternative fuels are available for cars, trucks and buses that produce little or no air pollution True or False |
| 17. Coal, oil, gasoline and natural gas are all considered fossil fuels. True or False |
| |

| | tt 50% of the volatile organic compounds (VOCs) released |
|--|--|
| into Indiana's air each year. | |
| True or False | |
| 19. It is better to not use the drive-th | ru on days when ozone levels are high. |
| True or False | |
| | |
| | lered to be a renewable energy source. |
| True or False | |
| C Ward Matala (2 | |
| C. Word Match: (2 points each) | |
| Ground-level Ozone | Criteria Pollutants Greenbelt |
| Nitrogen Oil | Dobson Unit |
| Methane | Air pollution monitors |
| Non-road sources | Compressed Natural Gas (CNG) |
| Ozone Action Days | Acid rain |
| Coal | Atmosphere |
| Non-renewable energy | Oxygen |
| Thermosphere | Troposphere |
| Lead | Carbon Monoxide |
| Buffers | Solar |
| Gasoline | |
| 1 is the most importan | nt natural and manmade greenhouse gas. |
| 2. and a | re two examples of fossil fuels which can release pollutants |
| when used to make energy. | |
| 3. Cities and towns can use | to help reduce the air pollution because the trees, |
| | carbon dioxide and catch pollutants. |
| 4. Some alternative vehicles use when burned, other than water vapor | because it releases no pollutants to air |
| 5 can not be | regenerated or reused. |
| 6. The is the | e layer of air which surrounds the earth. |
| | n problems for people, plants and animals because it can |
| destroy living cells. | |

Grades 7-8 R-5

| 8. During the summer months, local or state officials may call anpeople to the need to help reduce air pollution. | to alert |
|---|----------|
| 9. Indiana is one of the top three producers in the United States. | |
| 10. CFCs created in the can work their way up to the "good" ozone la | ıyer. |
| 11 and are the two most common gases in the earth's atmosphere. | |
| 12 is a category of air pollution sources which can be hard to count and include small engines like weed eaters. | l |
| 13. A is used as the basic measurement of the ozone layer's thickness. | |
| 14. The pH of can affect the plant life, aquatic life and buildings and monuments. | |
| 15. IDEM is required to monitors for six primary pollutants called | |
| 16 and are two of the dirty six pollutants. | |
| 17. The earth's atmosphere has four layers. The layer where temperatures can get as high a 1000°F is called the | as |
| 18. Miners used canaries as natural in the 1800's. | |
| 19. Because of the limestone in Indiana's soil, the soil the pH of acid rain helps reduce the effect on plants. | and |
| 20 energy can be used to fuel cars and homes. | |

D. Essay: (5 points each)

1. Discuss the five source categories on the Wheel of Sources (mobile, residential, non-road, area, industrial). Discuss the differences between each and give examples of each.

R-6 Grades 7-8

| 2. Where does acid rain come from and what are some possible solutions? |
|---|
| 3. If all of the countries in the world stopped producing chlorofluorocarbons (CFCs) today, why wouldn't the holes in the protective ozone layer disappear immediately? |
| 4. Why does ground-level ozone form mainly during summer months in Indiana? |
| |
| |

Grades 7-8 R-7

Air Module Review

Units 1 - 5 ANSWER KEY

A. Multiple Choice: (1 point each)

- 1. Where is the "good" ozone layer located?
- C. Stratosphere
- 2. What does the good ozone layer protect the earth from?
- C. Ultraviolet radiation
- 3. Which of the following appliances could have CFCs in them?
- B. Refrigerators
- 4. Skin cancer, eye cataracts and crop damage can all be caused by what?
- B. Ultraviolet radiation
- 5. Partners for Clean Air and the Indianapolis Knozone Program are examples of what kind of program?
- C. Both A and B
- 6. Originally used to describe a combination of smoke and fog, which term is now used to describe a common summertime air pollution problem found in Indiana?
- B. Smog
- 7. Each day, you breath how much air?
- C. 35 lbs.
- 8. Acid rain is formed by the mixing of water and what chemical?
- B. Sulfur dioxide
- 9. Lightening and forest fires are examples of natural sources of air pollution. What is another possible source?
- A. Volcanoes
- 10. The pH scale ranges from 0 to 14. An acid has what pH?
- C. < 7
- 11. Which category of air pollution sources doesn't move around and is easier to count emissions from?
- B. Point sources

Grades 7-8 A-1

- 12. This form of pollution can come from dust, soot or even paved roads.
- C. Particulate
- 13. You can help reduce air pollution on high ozone days by doing which of the following?
- A. Riding your bike
- 14. Over which country can you find one of the holes in the protective ozone layer?
- A. Australia
- 15. Glues in plywood and pressed wood products contain what kind of chemical that can contribute to indoor air pollution?
- B. Formaldehyde
- 16. This is the second largest component of air.
- C. Oxygen
- 17. What are the air pollution standards called that protect human life?
- A. Primary standards
- 18. What was the name of the 1963 federal regulations that gave state and local governments directions on how to begin cleaning up the air?
- A. Clean Air Act
- 19. What kind of air pollution can prevent your body from getting the oxygen it needs to survive? *C. Carbon monoxide*
- 20. What was the international treaty designed to eliminate the production of most CFCs called? *A. Montreal Protocol*
- B. True or False: (1 point each)
- 1. North America has an ozone hole located over it.

True

2. Countries that don't use CFCs will not be affected by ozone holes.

False

3. An ozone hole is actually a thin area of the protective ozone layer.

True

4. Ground-level ozone molecules are the same as ozone found in the protective ozone layer.

True

A-2 Grades 7-8

5. Certain lung diseases and conditions can be made worse by ground-level ozone.

True

6. Indiana does not have temperature inversions.

False

7. The atmosphere extends about 120 kilometers or 75 miles above the earth's surface.

True

8. Smog in Indiana is emitted directly into the air by factories and point sources.

False

9. When breathed in, sulfur dioxide can irritate your lungs and hurt people with lung disease or respiratory problems.

True

10. Lemon juice is basic.

False

11. The United States Environmental Protection Agency (US EPA) adopted a new national ozone standard in 1997.

True

12. You can always see air pollution.

False

13. Most of Indiana's air pollution comes from large, point sources like factories.

False

14. Ground-level ozone is a problem for only four areas of Indiana.

False

15. Topography can affect how air pollution moves around Indiana.

True

16. Alternative fuels are available for cars, trucks and buses that produce little or no air pollution.

True

17. Coal, oil, gasoline and natural gas are all considered fossil fuels.

True

Grades 7-8 A-3

18. Cars and trucks account for about 50% of the volatile organic compounds (VOCs) released into Indiana's air each year.

True

19. It is better to not use the drive-thru on days when ozone levels are high.

True

20. Coal is a fossil fuel that is considered to be a renewable energy source.

False

C. Word Match: (2 points each)

Ground-level Ozone Criteria Pollutants

Nitrogen Greenbelt
Oil Dobson Unit

Methane Air pollution monitors

Non-road sources Compressed Natural Gas (CNG)

Ozone Action Days
Coal
Atmosphere
Non-renewable energy
Thermosphere
Lead
Acid rain
Atmosphere
Oxygen
Troposphere
Carbon Monoxide

Buffers Solar

Gasoline

- 1. *Methane* is one of the most important natural and manmade greenhouse gas.
- 2. *Gasoline* and *oil* are two examples of fossil fuels which can release pollutants when used to make energy.
- 3. Cities and towns can use *greenbelts* to help reduce the air pollution because the trees, shrubs and vegetation use up excess carbon dioxide and catch pollutants.
- 4. Some alternative vehicles use *compressed natural gas (CNG)* because it releases no pollutants to air when burned, other than water vapor.
- 5. *Non-renewable energy* can not be regenerated or reused.
- 6. The *atmosphere* is the layer of air which surrounds the earth.
- 7. *Ground-level ozone* can cause health problems for people, plants and animals because it can destroy living cells.

A4 Grades 7-8

- 8. During the summer months, local or state officials may call an *Ozone Action Day* to alert people to the need to help reduce air pollution.
- 9. Indiana is one of the top three *coal* producers in the United States.
- 10. CFCs created in the *troposphere* can work their way up to the "good" ozone layer.
- 11. Nitrogen and oxygen are the two most common gases in the earth's atmosphere.
- 12. *Non-road sources* is a category of air pollution sources which can be hard to count and include small engines like weed eaters.
- 13. A *Dobson Unit* is used as the basic measurement of the ozone layer's thickness.
- 14. The pH of *acid rain* can affect the plant life, aquatic life and buildings and monuments.
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Grades 7-8 A-5

pollution (e.g. weedeaters, lawn mowers, boats).

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A-6 Grades 7-8